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SUMMARY

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COMMERCIALLY FEASIBLE METHODS FOR THE DEHYDRATION OF MEAT

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COMMERCIALLY FEASIBLE METHODS FOR THE DEHYDRATION OF MEAT.

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The diet of people in less well developed areas is often seriously deficient in animal protein. In some circumstances the most economical provision of the needed protein may be in the form of dried meat. Sun dried meat, which has been produced under primitive conditions from time immemorial, is acceptable in small communities by reason of convenience and acquired taste.

For more widespread consumption, meat is now dried in various types of dehydrators in which the processing conditions can be strictly controlled.

The main advantages of drying are the savings in weight and space, particularly if the product is compressed, and in packaging material. Long storage life without costly refrigeration is an additional advantage.

In an assessment of quality and keeping properties of dried meat many factors must be considered including: form (powder, mince, slices, chunks, steaks and chops), meat flavour and absence of off-flavours (stale, foreign, burnt, pressure-cooked, and rancid), texture (tenderness, juiciness, woolliness and fatness), reconstitution, nutritive value, and microbial contamination. It has been shown by J.G. Sharp ("Dehydrated Meat", Special Report of the Food Investigation Board, London, 1953) that the nutritive value of air dried mince is satisfactory, providing the drying temperature is kept below 80°C. In general, losses of the vitamin B group are similar to those found in household cooking.

A variety of commercially feasible methods for dehydration of meat is available and in selecting any one, the factors to be considered are: quality of raw material, the final form of the dried meat desired, its quality and shelf life, the effect of its processing on nutritive value, palatability, the economics of the process, and the availability of essential services.

The following methods are described and discussed:-

(a) Drying by heated air. Only pre-cooked mince can be dried satisfactorily by this method. After boning, pieces of meat are cooked lightly at atmospheric pressure and the concentrated cooking liquors are returned to the minced cooked meat before drying. Further details and references to relevant research papers may be found in a paper by A.R. Prater. ("Meat Dehydration", C.S.I.R.O. Division of Food Preservation, Circular 6-P, 1962), including cross-draught and through-draught (both batch and

continuous) and the rotolouvre. A possible new type is a belt trough dryer developed for other foods; this however has yet to be proved satisfactory for meat.

(b) Drying under reduced pressure. The use of this principle makes possible the drying of pieces of meat such as chunks, steaks, and chops. Three examples of techniques using this principle are: vacuum drying, New Zealand vacuum method, and freeze drying. Dried meat chunks of reasonable quality are produced by vacuum drying, but unlike air drying, tough meat from aged animals cannot be utilised satisfactorily. In the New Zealand method water is removed rapidly by dropping frozen chunks into heated fat in a vacuum vessel. Although the initial quality of the product may be reasonable its storage life is poor. Freeze drying, although capable of giving a high quality product, cannot at its present stage of development be regarded as commercially feasible in the less developed areas.

(c) Contact drying. Drying in a melter dryer, which is basically a steam jacketted horizontal cylinder with a paddle agitator, produces a rather unpalatable product of low nutritive value. Dried meat powder may be produced on roller dryers, but the danger of scorching is great. Some improvement in the quality of the products from both methods may be made by the use of a vacuum with a lower drying temperature.

Dried meat is perishable and, to maintain quality a careful control over packaging and storage conditions is necessary. To minimise water uptake, and so restrict mould and bacterial growth, dried meat must be packed in a moisture-proof rigid or flexible container. Oxidative charges leading to the development of stale flavours may be minimised by packing in nitrogen in gas-proof containers. Compression of the meat, which excludes a high proportion of the air, enhances shelf life. Lowering the temperature of storage increases keeping qualities. For example, air packs of dried mutton mince having a shelf life of approximately 10 months at 77°F, may maintain quality for 18 months at 32°F. Gas packing should at least treble these times.

Generally, it may be stated that if mince is a form of meat acceptable to the peoples of less developed areas, then the method of drying by heated air compares more than favourably with the other methods.

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